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(54) METHOD FOR MANUFACTURING PRINTING PLATE

(57)Abstract:

PROBLEM TO BE SOLVED: To manufacture a printing plate without special developing process by recording an image under an ink jet recording system which uses a specific printing plate material and ensures the achievement of a technically high level range of printing and further, uses an aqueous and an oily ink which are available at a low cost with the help of a device.

SOLUTION: This method for manufacturing a printing plate uses the printing plate material having a layer A which contains a material 1 showing water insolubility or a possible change from water solubility to the water insolubility at 60°C or higher and a material 2 showing the water solubility and crystallizability with a melt point within the range of 60-300°C. In addition, the method is characterized in that the ink containing a photothermal conversion element is supplied in an imaginal fashion, to the surface of the printing plate material by an ink jet process and the entire surface of the printing plate material is exposed to light of the absorption wavelength of the photothermal conversion material and further, the non-image part of the layer A is removed by water.

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CLAIMS

[Claim(s)]

[Claim 1] The material 1 which may change from water solubility to water-insoluble nature above water-insoluble nature or 60 degrees C on a base material, In the manufacture approach of the printing version using the charge of a printing plate which are water solubility and crystallinity and has the layer A containing the material 2 which has the melting point in the range of 60-300 degrees C The manufacture approach of the printing version characterize by expose the whole surface with the light of the absorption wavelength of said light and heat conversion material on this charge front face of a printing plate , and subsequently remove the non-image section of Layer A with an ink jet method using water on it after give the image the ink containing a light and heat conversion material .

[Claim 2] The manufacture approach of the printing version according to claim 1 characterized by using two or more ink in which the class of light-and-heat conversion material to contain differs at least from one side of an amount.

[Claim 3] The manufacture approach of the printing version according to claim 1 or 2 characterized by having the hydrophilic layer B between said Layers A and base materials.

[Claim 4] The manufacture approach of the printing version according to claim 2 characterized by said hydrophilic layer B being porosity.

[Claim 5] The manufacture approach of the printing version according to claim 3 or 4 characterized by being what said hydrophilic layer B contains alkaline colloidal silica and water-soluble polysaccharide, and has the concavo-convex structure of 0.1-50-micrometer pitch on the front face of this layer B.

[Claim 6] The manufacture approach of claim 1 characterized by for said material 1 being water-insoluble nature, and being material 1a which has the melting point in the range which is 60-300 degrees C thru/or the printing version of five given in any 1 term.

[Claim 7] The manufacture approach of the printing version according to claim 6 characterized by the melting point of said material 2 being higher than the melting point of said material 1a.

[Claim 8] The manufacture approach of claim 1 characterized by being material 1b from which said material 1 solidifies above 60 degrees C, and can serve as a water-insoluble nature congelation thru/or the printing version of five given in any 1 term.

[Claim 9] The manufacture approach of the printing version according to claim 8 of water-soluble protein and a water-soluble glycoprotein that said material 1b comes out on the other hand at least, and it is characterized by a certain thing.

[Claim 10] The manufacture approach of claim 1 characterized by having the melting point in the range said whose material 2 is 70-260 degrees C thru/or the printing version of nine given in any 1 term.

[Claim 11] The manufacture approach of claim 1 characterized by said material 2 being an oligosaccharide thru/or the printing version of ten given in any 1 term.

[Claim 12] The manufacture approach of the printing version according to claim 11 characterized by said oligosaccharide being at least one sort chosen from trehalose, a maltose, a galactose, a sucrose, a lactose, and a raffinose.

[Claim 13] The manufacture approach of the printing version according to claim 12 characterized by

establishing the desiccation process of the image formed by ink grant between the process which gives an image with an ink jet method, and the process exposed completely.

[Claim 14] The manufacture approach of the printing version characterized by subsequently to remove the non-image section of Layer C using water with an ink-jet method on this charge front face of a printing plate in the manufacture approach of the printing version using the charge of a printing plate which has the layer C which contains the material 3 which may change with acids from water solubility to water-insoluble nature on a base material after giving the image the ink containing an acid .

[Claim 15] The manufacture approach of the printing version according to claim 14 characterized by using two or more ink in which the class of acid to contain differs at least from one side of an amount.

[Claim 16] The manufacture approach of the printing version according to claim 14 or 15 characterized by having the hydrophilic layer B between said Layers C and base materials.

[Claim 17] The manufacture approach of the printing version according to claim 16 characterized by said hydrophilic layer B being porosity.

[Claim 18] The manufacture approach of the printing version according to claim 16 or 17 characterized by being what said hydrophilic layer B contains alkaline colloidal silica and water-soluble polysaccharide, and has the concavo-convex structure of 0.1-50-micrometer pitch on the front face of this layer B.

[Claim 19] The manufacture approach of the printing version of claim 14-18 given in any 1 term of water-soluble protein and a water-soluble glycoprotein that said material 3 comes out on the other hand at least, and it is characterized by a certain thing.

[Claim 20] The manufacture approach of the printing version of claim 14-19 characterized by said layer C containing an oligosaccharide given in any 1 term.

[Claim 21] The manufacture approach of the printing version according to claim 20 characterized by said oligosaccharide being at least one sort chosen from trehalose, a maltose, a galactose, a sucrose, a lactose, and a raffinose.

[Claim 22] The manufacture approach of the printing version of claim 1-21 characterized by establishing the desiccation process of the image formed by ink grant between the process which gives an image with an ink jet method, and the process which removes the non-image section of Layer A or Layer C using water given in any 1 term.

[Claim 23] The manufacture approach of the printing version of claim 1-22 characterized by performing the process which removes the non-image section of Layer A or Layer C using water on a printing machine given in any 1 term.

[Claim 24] The manufacture approach of the printing version of claim 1-23 characterized by performing even the process which removes the non-image section of Layer A or Layer C from the process which gives an image with an ink jet method using water on a printing machine given in any 1 term.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the manufacture approach of the printing version which forms an image with a computer two plate (CPT) method about the manufacture approach of the printing version.

[0002]

[Description of the Prior Art] With digitization of print data, it is cheap, handling is easy and CPT with printing **** equivalent to a PS plate is calculated. CPT of the various methods especially by recent-years and infrared laser record is proposed. The so-called dry CPT (the development on a printing machine is included) which does not need a special development in them attracts attention. For example, what is indicated by Patent Publication Heisei No. 507727 [eight to], 6-186750, 6-199064, 7-314934, 10-58636, and 10-244773 is mentioned.

[0003] However, these methods have the very high energy needed for image formation, and the aligner is also expensive.

[0004] The solid ink method which CPT which forms a direct oleophilic image in the base material which has a hydrophilic front face with an ink jet method on the other hand, that is, manufactures the printing version without a special development is also proposed, for example, is indicated by JP,11-139016,A and 11-139017 is held. This ink jet method has the description that equipment is cheaper than dry CPT.

[0005] However, by the ink jet method of the type which is made to carry out melting of solid ink like a solid ink method, and injects it with heat, it is difficult, and in the present condition, lessening capacity of one drop of injection drop does not pass on the level which attains the resolution of 600dpi (dpi expresses number of dots per 2.54cm.) extent, and, now, it cannot say that it is suitable for printing of high-definition printed matter.

[0006] Moreover, by the ink jet method by usual water color ink, it has come to manufacture the printing version which has print durability it is difficult to form the image layer which can be equal to printing which uses dampening water, and sufficient also by the ink jet method in oily ink.

[0007] Thus, in the present condition, the method of manufacturing the printing version which also fitted high-definition printing using cheap equipment, without needing a special development is not offered.

[0008]

[Problem(s) to be Solved by the Invention] Succeeding in this invention in view of the above-mentioned situation, using the specific charge of a printing plate, the purpose is recording an image using the ink jet recording method using aquosity and oily ink arriving at the field of a high level technically, and cheap [equipment], and available, and is to offer the manufacture approach of the possible printing version of manufacturing without a special development.

[0009]

[Means for Solving the Problem] The above-mentioned technical problem of this invention was attained by the following configurations.

[0010] 1. Material 1 Which May Change from Water Solubility to Water-insoluble Nature above Water-insoluble Nature or 60 Degrees C on Base Material, In the manufacture approach of the printing version using the charge of a printing plate which are water solubility and crystallinity and has the layer A containing the material 2 which has the melting point in the range of 60-300 degrees C The manufacture approach of the printing version characterize by expose the whole surface with the light of the absorption wavelength of said light and heat conversion material on this charge front face of a printing plate , and subsequently remove the non-image section of Layer A with an ink jet method using water on it after give the image the ink containing a light and heat conversion material .

[0011] In the mode of the above 1, it is desirable to use two or more ink in which the class of light-and-heat conversion material to contain differs at least from one side of an amount.

[0012] Moreover, it is desirable to have the hydrophilic layer B between said Layers A and base materials. Moreover, it is desirable that said hydrophilic layer B is porosity.

[0013] Moreover, it is desirable that it is what said hydrophilic layer B contains alkaline colloidal silica and water-soluble polysaccharide, and has the concavo-convex structure of 0.1-50-micrometer pitch on the front face of this layer B.

[0014] Moreover, it is desirable that said material 1 is water-insoluble nature, and it is material 1a which has the melting point in the range which is 60-300 degrees C.

[0015] Moreover, it is desirable that the melting point of said material 2 is higher than the melting point of said material 1a. Moreover, it is desirable that it is material 1b from which said material 1 solidifies above 60 degrees C, and can serve as a water-insoluble nature congelation.

[0016] Moreover, on the other hand, water-soluble protein and a water-soluble glycoprotein come out [said material 1b] at least, and a certain thing is desirable.

[0017] Moreover, it is desirable to have the melting point in the range said whose material 2 is 70-260 degrees C. Moreover, it is desirable that said material 2 is an oligosaccharide.

[0018] Moreover, it is desirable that said oligosaccharide is at least one sort chosen from trehalose, a maltose, a galactose, a sucrose, a lactose, and a raffinose.

[0019] Moreover, it is desirable to establish the desiccation process of the image formed by ink grant between the process which gives an image with an ink jet method, and the process exposed completely.

[0020] Moreover, it is desirable to establish the desiccation process of the image formed by ink grant between the process which gives an image with an ink jet method, and the process which removes the non-image section of Layer A using water.

[0021] It is desirable to perform the process which removes the non-image section of **** A using water on a printing machine.

[0022] Moreover, it is desirable to perform even the process which removes the non-image section of Layer A from the process which gives an image with an ink jet method using water on a printing machine.

[0023] 2. Manufacture approach of printing version characterize by subsequently to remove the non-image section of Layer C using water with ink jet method on this charge front face of printing plate in manufacture approach of printing version using charge of printing plate which have layer C which contain material 3 which may change with acids from water solubility to water-insoluble nature on base material after give the image ink containing acid .

[0024] In the mode of the above 2, it is desirable to use two or more ink in which the class of acid to contain differs at least from one side of an amount.

[0025] Moreover, it is desirable to have the hydrophilic layer B between said Layers C and base materials. Moreover, it is desirable that said hydrophilic layer B is porosity.

[0026] Moreover, it is desirable that it is what said hydrophilic layer B contains alkaline colloidal silica and water-soluble polysaccharide, and has the concavo-convex structure of 0.1-50-micrometer pitch on the front face of this layer B.

[0027] Moreover, on the other hand, water-soluble protein and a water-soluble glycoprotein come out [said material 3] at least, and a certain thing is desirable.

[0028] Moreover, it is desirable that said layer C contains an oligosaccharide. Moreover, it is desirable

that said oligosaccharide is at least one sort chosen from trehalose, a maltose, a galactose, a sucrose, a lactose, and a raffinose.

[0029] Moreover, it is desirable to establish the desiccation process of the image formed by ink grant between the process which gives an image with an ink jet method, and the process which removes the non-image section of Layer C using water.

[0030] It is desirable to perform the process which removes the non-image section of **** C using water on a printing machine.

[0031] Moreover, it is desirable to perform even the process which removes the non-image section of Layer C from the process which gives an image with an ink jet method using water on a printing machine.

[0032] About an improvement of the problem of the equipment price in dry CPT in the case of using infrared laser etc., this invention Or it is made for the purpose of improving the resolution of dry CPT of an ink jet method with inadequate resolution, although an equipment price is cheap. The specific material which changes from water solubility to water-insoluble nature above water-insoluble nature or 60 degrees C paying attention to the image formation material of CPT as a result of this invention persons' examining those problems wholeheartedly, An image is recorded on the image formation layer contained combining a water-soluble specific material using the ink containing a light-and-heat conversion material. The whole surface is exposed with the light containing the absorption wavelength of a light-and-heat conversion material, the image section is made into water-insoluble nature, and it results in a header and this invention that the printing version can be manufactured by removing the image formation layer of the non-image section using water after that.

[0033] Moreover, it results in a header and this invention that the printing version can be manufactured by recording an image on the image formation layer containing the specific material which changes from water solubility to water-insoluble nature using the ink containing an acid, making the image section insoluble in water, and removing the image formation layer of the non-image section similarly using water after that with an acid.

[0034] That is, the charge of a printing plate which used the above-mentioned material for the image formation layer on a base material becomes it is possible to record an image by the ink jet recording method using the water color ink which has high resolution, and possible [also forming the image which is using the ink used for record as two or more sorts of ink in which the concentration of a high temperature conversion material or an acid differs, and was further excellent in gradation nature].

[0035] Since the charge of a printing plate in this invention has very prompt water development, it is also possible to carry out by equipping a printing machine with the charge of a printing plate with undeveloping negatives, and using dampening water on a printing machine. Moreover, it is preferably applicable also to the printing machine which performs image recording / dampening water development on a printing machine using an ink jet recording device, and the so-called on-press printing machine.

[0036] The layers A on a base material are water-insoluble nature or the material 1 which may change from water solubility to water-insoluble nature above 60 degrees C and water solubility, and crystallinity, and one of the descriptions of the image formation in this invention is to contain combining the material 2 which has the melting point in the range of 60-300 degrees C.

[0037] Material 1a which is water-insoluble nature and has the melting point in the range of 60-300 degrees C as one type of a material 1 is mentioned. Moreover, material 1b which solidifies above 60 degrees C and changes from water solubility to water-insoluble nature as another type is mentioned.

[0038] When material 1a and a material 2 are combined, a material 2 carries out thermofusion also of the material 2 with material 1a by generation of heat by exposure, and assists formation of the image section in which ink acceptance is possible with a mechanism which is mentioned later at the Records Department in the ink containing a light-and-heat conversion material while it gives the good water development nature in the non-Records Department.

[0039] On the other hand, when material 1b and a material 2 are combined, at the non-Records Department, a material 2 gives good water development nature similarly, it is generation of heat by exposure, and with the coagulation of material 1b, is considered that a material 2 forms an insoluble

hybrid in material 1b and water by mechanism which is mentioned later, and contributes it to formation of the image section in which ink acceptance is possible at the Records Department in the ink containing a light-and-heat conversion material.

[0040] It has good water development nature and image formation ability also in the combination of Materials 1a and 1b and a material 2 according to the mechanism which the above mixed.

[0041] The height of the soluble S/N ratio to the water in such the non-Records Department / the Records Department is peculiar to the combination of the material 1 in this invention, and a material 2.

[0042] Another of the description of the image formation in this invention has the layer C on a base material in containing the material 3 which may change with acids from water solubility to water-insoluble nature. In case ink is given to the image, while giving the good water development nature of the non-Records Department similarly by using the ink containing an acid, the Records Department contributes to formation of the image section in which ink acceptance is possible.

[0043] Hereafter, this invention is explained to a detail.

[1] On a base material, the charges of a printing plate in charge this invention of a printing plate are water-insoluble nature or the material 1 which may change from water solubility to water-insoluble nature above 60 degrees C and water solubility, and crystallinity, and are characterized by having the layer A containing the material 2 which has the melting point at the range of 60-300 degrees C. As for Layer A, it is desirable to be formed as a layer which continued on the base material.

[0044] It is desirable to have the hydrophilic layer B between the layers A prepared on the base material and this base material, it excels in dirt-proof nature, and scratch dirt reinforcement can serve as a charge of a printing plate corresponding to good heat mode record. When the hydrophilic property of the hydrophilic layer B in this invention prints with the printing machine using dampening water, it means the thing with the property stronger (ink cannot adhere easily) than ink which receives water.

[0045] The configuration of the charge of a printing plate of this invention can mention a thing like base material layer A / hydrophilic layer B / base material which presents for example, layer A / hydrophilic property. Moreover, it is also possible to add an under-coating layer, a back coat layer (for mat material and lubricant to also be contained), and other layers to the above-mentioned configuration further.

<Layer A> It is water-insoluble nature or the material 1 which may change from water solubility to water-insoluble nature above 60 degrees C and water solubility, and crystallinity, and the material 2 which has the melting point in the range of 60-300 degrees C is contained.

[0046] In this invention, solubility [as opposed to 25-degree C water in water-insoluble nature] (more than g to 100g of water) says less than 0.1 thing. Moreover, as for water solubility, the above-mentioned solubility says 0.1 or more things.

[0047] In a mass ratio with the whole layer A, the content (when using both material 1a and material 1b, it is the total quantity) of the material 1 in Layer A is 1 - 99%, and is 30 - 80% still more preferably 20 to 90% preferably.

[0048] Similarly, in a mass ratio with the whole layer A, the content of a material 2 is 1 - 99%, and is 10 - 80% preferably. Moreover, as for the ratio of a material 1 and a material 2, material 1:material 2=1:0.1-1:10 are desirable, and it is 1:0.3-1:4 more preferably.

- It is divided into material 1a which is water-insoluble nature and has the melting point in the range of 60-300 degrees C, and material 1b which becomes water-insoluble nature above 60 degrees C at a room temperature although it is water solubility as a desirable thing of the material 1 contained for one layer of materials A.

- As material 1a material 1a, the material generally classified as a wax is desirable. As physical properties, it is desirable that they are the softening temperature 40 degrees C or more of 120 degrees C or less and 60-degree-C or more melting point of 150 degrees C or less, and it is still more desirable that they are the softening temperature 40 degrees C or more of 100 degrees C or less and 60-degree-C or more melting point of 120 degrees C or less. The melting point is [shelf life] a problem at less than 60 degrees C, and when the melting point is higher than 300 degrees C, ink impression sensibility falls.

[0049] As a material usable as material 1a, paraffin, polyolefine, polyethylene wax, a micro crystallin wax, a fatty-acid system wax, etc. are mentioned. These are about 10000 things from molecular weight

800. Moreover, in order to make it easy to emulsify, these waxes can be oxidized, and polar groups, such as a hydroxyl group, an ester group, a carboxyl group, an aldehyde group, and a peroxide radical, can also be introduced. Furthermore, in order to lower softening temperature or to raise workability, it is also possible to add the methylol ghost of stearamide, a RINOREN amide, a lauryl amide, a milli SUTERU amide, a hardening cow fatty-acid amide, palmitamide, oleic amide, a U.S. sugar fatty-acid amide, coconut fatty-acid amides, or these fatty-acid amides, a methylenebis SUTERARO amide, an ethylene screw SUTERARO amide, etc. in these waxes. Moreover, the copolymer of coumarone-indene resin, rosin denaturation phenol resin, terpene denaturation phenol resin, xylene resin, ketone resin, acrylic resin, ionomers, and these resin can also be used.

[0050] It is desirable to contain also in these any of polyethylene, micro crystallin ** fatty acid ester, and a fatty acid they are. These materials have the comparatively low melting point, and since melt viscosity is also low, they can perform image formation of high sensitivity. Moreover, since these materials have lubricity, the damage to the layer A at the time of shearing force being applied to the front face of Layer A reduces them, and its printing dirt resistance by a grinding crack etc. improves further.

[0051] Moreover, as for material 1a, it is desirable to have the particle-like gestalt within Layer A, and it is desirable for it to be able to distribute to ****. As for the mean particle diameter, it is desirable that it is 0.01-10 micrometers, and it is 0.1-3 micrometers more preferably. When the mean particle diameter of material 1a is smaller than 0.01 micrometers and the coating liquid of Layer A is applied on the hydrophilic porosity layer B, the particle of material 1a enters into the pore of the hydrophilic layer B, or the clearance between irregularity with a detailed hydrophilic layer B front face is entered, or it becomes easy to carry out, water development becomes inadequate, and concern of a greasing arises. When the mean particle diameter of material 1a is larger than 10 micrometers, resolution falls.

[0052] Moreover, the particle-like material 1 may be changing continuously or may be covered with the material for which presentations with the interior and a surface differ.

[0053] The covering approach can use the well-known microcapsule formation approach, a sol gel process, etc.

- As material 1b material 1b, water-soluble protein and a water-soluble glycoprotein are desirable. As these examples, although ovalbumin, casein, soybean protein, synthetic protein, the protein compounded in gene engineering are mentioned, especially ovalbumin is desirable. In a water solution, from near 58 degree C, denaturation is started (thickening starts), and near 80 degree C, it denaturalizes completely and solidifies.

[0054] Although usually supplied by fine particles in many cases, in case it is processed into fine particles, ovalbumin may make them fine particles, after removing the saccharide which has separated in ovalbumin for the purpose, such as discoloration prevention at the time of preservation, and a united saccharide by the well-known approach, but even if it is a part or the all removed ovalbumin about such a saccharide, it can use a part or all for this invention for them preferably.

[0055] Reforming of water-soluble protein and the water-soluble glycoprotein may be carried out for stabilization (raising denaturation temperature also contains), such as a shelf-life improvement and sensitivity settling. An approach well-known as the approach of reforming is usable. Protein is made more into stability by specifically reinforcing the force currently committed to stabilization of a proteinic spacial configuration, or removing distortion concerning native structure. The balanced-like stability is acquired also by on the other hand making a denaturation condition into instability more. The following is mentioned as a policy of stabilization.

[0056] A. a native condition The conversion C. denaturation condition of the removal exposure hydrophobic group of the discharge mold cavity of the abnormality bond angle in removal of the removal inconvenient charge of distortion concerning the enhancement B. native structure like ligand combining sites, such as an enhancement metal of the enhancement hydrogen bond of the enhancement electrostatic interaction of non-dense hydraulic power carried out more to stability The formation of a coating fixed polymer, and material 2 material 2 by conversion D., the other sugar chains to other side chains of the conversion glycine to the proline of the introductory side chain of the bridge formation

made more into instability, and synthetic macromolecule. Although it is usable even if it is which material, if it is water solubility and crystallinity and is the material which fulfills the conditions of having the melting point in the range of 60-300 degrees C, an oligosaccharide is desirable also especially in it. Since the solubility of an oligosaccharide to water is good, prompt water development can be performed.

[0057] An oligosaccharide is the crystalline substance meltable in water which generally has sweet taste, and some monosaccharides carry out dehydration condensation by the glycosidic linkage. Since an oligosaccharide is a kind of o-glycoside which makes sugar an aglycon, it hydrolyzes easily from an acid and it is classified into a disaccharide, a trisaccharide, tetrasaccharide, 5 sugar, etc. according to the molecularity of the monosaccharide which produces and generates a monosaccharide. The oligosaccharide in this invention means the thing to a disaccharide - 10 sugar.

[0058] These oligosaccharides are classified also into the hetero oligosaccharide which consists of a gay oligosaccharide which is divided roughly into a reducibility oligosaccharide and a nonreducible oligosaccharide by the existence of a reduction radical, and is constituted from a single monosaccharide, and two or more kinds of monosaccharides.

[0059] An oligosaccharide exists naturally as the letter of isolation, or *****, and is obtained also by the partial hydrolysis by the acid or enzyme of a polysaccharide. In addition, various oligosaccharides generate also by the transglycosylation by the enzyme.

[0060] An oligosaccharide usually exists as a hydrate in an ambient atmosphere in many cases. Moreover, it is as follows, when a hydrate differs in the melting point from an anhydride and an example is given.

[0061]

[Table 1]

オリゴ糖種	融点(°C)	
	水和物	無水物
ラフィノース 三糖	80(5 水和物)	118
トレハロース 二糖	97(2 水和物)	215
マルトース 二糖	103(1 水和物)	108
ガラクトース 二糖	119(1 水和物)	167
スクロース 二糖	水和物なし	182
ラクトース 二糖	201	252

[0062] By this invention, in order to carry out spreading formation of the layer A in a water solution, by the oligosaccharide which forms a hydrate, it is thought that the melting point is the melting point of a hydrate.

[0063] The sugar of reducibility, for example, a maltose, is combined and colored by the Maillard reaction also in an oligosaccharide at the time of protein, amino acid, and heating, and it excels in the visible image property by the improvement in on the strength of the image section, and coloring. Moreover, since the denaturation depressor effect of the protein at the time of nonreducible sugar, for example, trehalose, having low hygroscopicity, and mixing it with protein is high, the use is suitable for improvement in shelf life. Trehalose is excellent in especially high contrast image formation with high sensitivity. Furthermore, although the solubility to water is high, hygroscopicity is very low and is very good. [of water development nature and shelf life]

[0064] Moreover, although a crystal of an anhydride will be served as if it is made to solidify after carrying out thermofusion of the oligosaccharide hydrate and removing the water of hydration (inside of a short time after coagulation), it characterizes trehalose that the melting point of an anhydride is higher than a hydrate 100 degrees C or more. Carrying out thermofusion of this by infrared exposure, it means that the exposed section will be in the condition of being hard to fuse in high-melting immediately after re-solidifying, and it has the effectiveness which is [the image defect at the time of exposure of banding etc.] lifting-hard, and carries out it. In order to attain the purpose of this invention, trehalose is desirable

also especially in an oligosaccharide.

[0065] It is thought that it combines with protein/glycoprotein with the denaturation of the protein/glycoprotein by heat or the acid, and these saccharides are insolubilized by water. Moreover, in the non-image section which does not produce the denaturation of protein/glycoprotein, existence of a saccharide or its derivative promotes the dissolution of Layer A, and the earliness of the standup (S/N of the image section / non-image section which beginning prints) of printing is raised.

[0066] The content of the saccharide in Layer A has desirable 1 - 400 mass % to the gross mass of the protein in Layer A, and/or a glycoprotein, is 20 to 200 mass % more preferably, and is 60 to 160 mass % still more preferably. Under by 1 mass %, the addition effectiveness of a saccharide is not seen, and if [than 400 mass %] more, the coagulation sensibility of Layer A will fall.

[0067] Next, the combination effect of a material 1 and a material 2 is described.

(Combination effect of material 1a and a material 2) Material 1a in Layer A fuses with heat fundamentally, and the image which can impress [that it is insoluble and] printing ink on water by contacting the hydrophilic front face of a layer A directly under, or permeating the interior of the pore of a porous hydrophilic layer, and solidifying and fixing with a temperature fall is formed. Although the material 2 enables water development, material 1a makes it possible to move and fix or to permeate the hydrophilic front face of a layer A directly under inside a porous hydrophilic layer by fusing material 2 the very thing with heat. Since a material 2 is crystallinity, it has the sharp melting point, and it can obtain a high contrast image, and the hygroscopicity of a material is low, and it does not spoil the engine performance in the preservation under highly humid. Moreover, in ordinary temperature, since it is a firm crystallized state, there is effectiveness which controls crack generating by the usual handling.

[0068] Moreover, as for the melting point of a material 2, it is desirable that it is higher than the melting point of material 1a. When a material 2 reaches the temperature which carries out melting initiation, this Since material 1a is in the condition of being easy to move in the direction of material 1a when it means being maintained at the condition of having fully fused and a material 2 carries out melting initiation, Preferentially, material 1a can move and fix or can form the image of high resolution in the hydrophilic front face of a layer A directly under by permeating the interior of a porous hydrophilic layer. The melting point difference (melting point of melting point-material 1a of a material 2 as a difference of the central value of melting point distribution of melting point each material) of material 1a and a material 2 has desirable 0.1-150 degrees C, is more desirable, and is still more desirable. [of 15-100 degrees C] [of 10-100 degrees C] As for the melting point of material 1a, it is more desirable that it is 50-150 degrees C, and it becomes [the balance of sensibility and shelf life is good and / balancing / of sensibility and shelf life / that it is 60-120 degrees C] still better and is desirable.

[0069] Furthermore, material 1a has a particle-like gestalt, and it is desirable that mean particle diameter is 0.01-10 micrometers, and it is more desirable that it is 0.1-3 micrometers. As for material 1a, in Layer A, it is desirable for it to be wrapped in by the material 2, to make and to exist. That is, a material 2 exists as a continuous phase and, as for material 1a, existing as a discontinuous phase is desirable. Moreover, it is desirable that material 1a is wrapped in by the material 2 and it is not substantially in contact with a hydrophilic layer front face [directly under].

[0070] Since it is such a gestalt, the property of the material 2 which is water solubility appears, and the layer A of the non-image section becomes very good [development nature]. Moreover, since a material 2 surely exists between a hydrophilic layer front face [directly under] and material 1a even if it is a case so that normal stress and shearing force may be applied to the front face of Layer A, a part of layer A may be destroyed and material 1a may be rubbed by the non-image section front face, it is removed at the time of the development by water, and does not become dirt at the time of printing.

[0071] When the mean particle diameter of material 1a is smaller than 0.01 micrometers and the coating liquid of Layer A is applied on the hydrophilic layer B in the configuration which forms Layer A on the porosity after-mentioned hydrophilic layer B, the particle of material 1a enters into the pore of the hydrophilic layer B, or the clearance between irregularity with a detailed hydrophilic layer B front face is entered, or it becomes easy to carry out, water development becomes inadequate, and concern of a greasing arises. Moreover, when Layer A fuses with heat, it will be in the condition that material 1a

fused in the fused material 2 distributed finely, and in order that the amount of material 1a to which separation with material 2 phase and a material 1a phase takes time amount, and Layer A moves and contacts on a hydrophilic front face [directly under] at the inside of a melting condition may decrease, sensibility and image reinforcement fall.

[0072] Moreover, when the mean particle diameter of material 1a is larger than 10 micrometers, since specific surface area becomes small, it is hard coming to fuse, and sensibility and resolution fall too. It becomes [mean particle diameter] very good [sensibility and resolution] in the range which is 0.1-3 micrometers and is desirable.

(Combination effect of material 1b and a material 2) Even if material 1b, for example, water-soluble protein, and a water-soluble glycoprotein are its simple substances, it solidifies with heat and they can carry out image formation. However, in use with a simple substance, the water development nature which is one of the purposes of this invention cannot be said to be fitness. The solubility to the water of water-soluble protein and a water-soluble glycoprotein can be promoted by combining a material 2 with this, and good water development fitness can be given.

[0073] Moreover, also in a material 2, the effectiveness which controls the denaturation of the water-soluble protein in the layer A at the time of preservation and a water-soluble glycoprotein by using an oligosaccharide is also acquired, and shelf life is good. Furthermore, in the exposure section, since an oligosaccharide forms hybrids, such as this protein and complex by salt linkage, and becomes insoluble in connection with the thermal denaturation of this protein at water, it causes neither the fall of sensibility, nor the fall of image reinforcement and is desirable.

(Material which can add other)

- Although a macromolecule polymer particle thermoplasticity hydrophobic macromolecule polymer particle is mentioned and there is no specific upper limit in the softening temperature of this thermoplastic hydrophobic macromolecule polymer particle, as for temperature, it is desirable that it is lower than the decomposition temperature of a macromolecule polymer particle. As for the weight average molecular weight (Mw) of a macromolecule polymer, it is desirable that it is the range of 10,000-1 million.

[0074] As an example of the macromolecule polymer which constitutes a macromolecule polymer particle For example, diene (**) polymers, such as polypropylene, polybutadiene, polyisoprene, and an ethylene-butadiene copolymer A styrene-butadiene copolymer, a methyl methacrylate-butadiene copolymer, Synthetic rubber, such as an acrylonitrile-butadiene copolymer, polymethylmethacrylate, A methyl methacrylate-(2-ethylhexyl acrylate) copolymer, A methyl methacrylate-methacrylic-acid copolymer, a methyl acrylate-(N-methylol acrylamide) copolymer, Acrylic ester (meta), such as a polyacrylonitrile, an acrylic-acid (meta) (**) polymer, Vinyl ester (**) polymers, such as a polyvinyl acetate and vinyl acetate-propionic-acid vinyl copolymer and a vinyl acetate-ethylene copolymer, Those copolymers, such as a vinyl acetate-(2-ethylhexyl acrylate) copolymer, a polyvinyl chloride, a polyvinylidene chloride, and polystyrene, are mentioned. Acrylic ester (meta), an acrylic-acid (meta) (**) polymer, a vinyl ester (**) polymer, polystyrene, and synthetic rubber are used preferably among these.

[0075] A macromolecule polymer particle may consist of a macromolecule polymer by which the polymerization was carried out by which well-known approaches, such as an emulsion-polymerization method, a suspension-polymerization method, a solution polymerization method, and a vapor-phase-polymerization method. The approach and macromolecule polymer which spray into inert gas, dry to the organic solvent of a macromolecule polymer, and atomize a solution to it by the solution polymerization method or the vapor-phase-polymerization method as an approach of atomizing the macromolecule polymer by which the polymerization was carried out are dissolved in water at a nonmiscible organic solvent, and the method of distilling off distribution and an organic solvent to water or an aqueous medium, and atomizing this solution to it etc. is mentioned. Moreover, also in which approach, water soluble resin, such as surface active agents, such as sodium lauryl sulfate, sodium dodecylbenzenesulfonate, and a polyethylene glycol, and polyvinyl alcohol, may be used as a dispersant and a stabilizer if needed in the case of a polymerization or atomization.

[0076] As for a macromolecule polymer particle, it is desirable to be used in the state of the dispersion liquid distributed by the dispersion medium, and it is desirable that it is a water dispersion.

[0077] the amount which it is desirable to have the particle size of 0.005-2 micrometers as for the particle size of a macromolecule polymer particle, and is contained in Layer A -- desirable -- one to 50 mass [of the whole layer A] % -- it is ten to 40 mass % more preferably.

- The surfactant of lubricant water solubility can be used. It is desirable to use the surfactant of a silicon system or a fluorine system especially. The addition of this surfactant has desirable 0.01 - 5 mass % of the whole layer A, and its 0.1 - 3 mass % is still more desirable.

- A mat material inorganic particle and an organic particle are mentioned, and general metallic-oxide particles, such as a silica, an alumina, aluminosilicate, a titania, and a zirconia, can be used as an inorganic particle. However, since sedimentation at the time of adding and distributing in a coating poses a problem, it is desirable that it is the porosity particle whose apparent specific gravity is 1.5 or less. Moreover, as for a configuration, it is desirable that it is close to a globular form. As such a porosity particle, the below-mentioned porosity silica particle, a porosity aluminosilicate particle, etc. are mentioned.

[0078] As an organic particle, general bridge formation resin particles, such as nylon, PMMA, silicone, Teflon (trademark), polyethylene, and polystyrene, can be used. Moreover, the polysaccharide particle which constructed the bridge by the general cross linking agent which has polyvalent metal ion and a glycidyl group for polysaccharide, such as a mannose, a pullulan, an alginic acid, a dextrin, glucomannan, starch, Cyamoposis Gum, and a cellulosic, and the cross linking agent containing formalin, and insolubilized in water is also usable. These particles may be beforehand adjusted as a water dispersion, and a certain dispersant may contain them in dispersion liquid.

[0079] In these, when the dispersibility to a drainage system coating and the hydrophilic property of the particle itself are taken into consideration, a porosity particle or a polysaccharide particle is desirable.

[0080] The porosity polysaccharide particle indicated by JP,10-297078,A as a polysaccharide particle can be used. The alginic-acid polyvalent-metallic-salt particle which constructed the bridge with polyvalent metal ion especially in the alginic acid is desirable.

- Polysaccharide, such as cellulotics, such as water soluble resin, for example, polyvinyl alcohol, silyl denaturation polyvinyl alcohol, cation denaturation polyvinyl alcohol, methyl cellulose, a carboxymethyl cellulose, and hydroxyethyl cellulose, alginate, and a pullulan, polyethylene oxide, polypropylene oxide, a polyethylene glycol (PEG), polyvinyl ether, a polyvinyl pyrrolidone, etc. are mentioned.

[0081] Moreover, cationic resin may be contained in a layer. As cationic resin, polyalkylene polyamine, such as a polyethylene amine and polypropylene polyamine, or the derivative of those, the acrylic resin that has the 3rd class amino group and the 4th class ammonium, a JIAKURIRU amine, etc. are mentioned. Cationic resin may be added with a particle-like gestalt. As for this, the cationic micro gel of a publication is mentioned to JP,6-161101,A.

[0082] Furthermore, a cross linking agent may be added in a layer. As a cross linking agent, melamine resin, an isocyanate compound, isoxazoles, aldehydes, N-methylol compound, a dioxane derivative, an activity vinyl compound, an activity halogenated compound, etc. can be mentioned, for example.

<Hydrophilic layer B> The hydrophilic layer B is formed between a base material and Layer A, and presents a hydrophilic property. That is, at the time of printing using dampening water, rather than ink, water has been received alternatively and ***** (ed). Moreover, as for the hydrophilic layer B, it is desirable that it is porosity, and this can be attained by containing porosity-ized material mentioned later, such as necklace-like colloidal silica and a porosity particle. Furthermore, it is desirable to contain a light-and-heat conversion material which is mentioned later.

[0083] What contains alkaline colloidal silica and water-soluble polysaccharide, and has the concavo-convex structure of 0.1-50-micrometer pitch on the front face of this layer as a mode with the hydrophilic desirable layer B is mentioned.

[0084] It is desirable to contain the necklace-like colloidal silica mentioned later as alkaline colloidal silica, and it is more desirable to contain colloidal silica with a mean particle diameter of 100nm or less

further.

[0085] Although it is difficult to specify a mechanism, it has found out becoming a good hydrophilic layer without a greasing also by the imprinting in printing by forming the hydrophilic layer B from alkaline coating liquid.

[0086] Moreover, as for the front face of the hydrophilic layer B, it is desirable to have the concavo-convex structure of 0.1-50-micrometer pitch like the aluminum grain of a PS plate, and water retention and its holdout of the image section improve with this irregularity.

[0087] Although the suitable thing which amount content is carried out and is formed is also possible in the filler of a suitable particle size for the hydrophilic layer B, in case said concavo-convex structure makes the coating liquid of the hydrophilic layer B contain alkaline colloidal silica and water-soluble polysaccharide and applies and dries a hydrophilic layer, it is desirable to produce phase separation and to form.

[0088] The gestalten (a pitch, surface roughness, etc.) of concavo-convex structure can be suitably controlled on class [of the class of the class of alkaline colloidal silica and an addition, and water-soluble polysaccharide and an addition, and other add-in material] and addition, solid content concentration [of coating liquid], wet thickness, and desiccation conditions etc.

[0089] It is more desirable that it is 0.2-30 micrometers as a pitch of concavo-convex structure, and it is still more desirable that it is 0.5-20 micrometers. Moreover, the concavo-convex structure of the multiplet structure where the concavo-convex structure where a pitch is smaller than it is formed on the concavo-convex structure where a pitch is big may be formed.

[0090] As surface roughness, 100-1000nm is desirable at Ra, and 150-600nm is more desirable.

- As porosity-ized material porosity-ized material, following a-c can be used preferably. It is desirable to use especially necklace-like colloidal silica. It is also possible to use together several sorts of porosity-ized material.

a. Securing the porosity of a layer by adding necklace-like colloidal silica necklace-like colloidal silica, it becomes possible to maintain reinforcement and can be preferably used as porosity-ized material of a layer.

[0091] The necklace-like colloidal silica used for this invention is the generic name of the moisture powder system of the spherical silica whose primary particle diameter is the order of nm. The necklace-like colloidal silica used for this invention means the colloidal silica of "the shape of a pearl necklace combined with the die length whose spherical colloidal silica whose primary grain particle diameter is 10-50nm is 50-400nm." The shape of a pearl necklace (the shape of namely, a pearl necklace) means that the image in the condition that the silica particle of colloidal silica stood in a row and joined together is carrying out a configuration like a pearl necklace. The shape of a pearl necklace is explained based on drawing.

[0092] Although drawing 2 is the mimetic diagram showing the decentralized structure of the silica particle of conventional colloidal silica, as shown here, conventional colloidal silica 1 is the dispersed system of the spherical silica particle 2. Although it is the mimetic diagram showing an example of the decentralized structure of necklace-like colloidal silica which uses drawing 1 for this invention to it, as shown here, necklace-like colloidal silica 3 is a dispersed system distributed after the spherical silica particle 4 has stood in a row. Association of the silica particles which constitute necklace-like colloidal silica is presumed to be -Si-O-Si- in which -SiOH radical which exists in a silica particle front face carried out dehydration association. As necklace-like colloidal silica, the Nissan Chemical Industries, Ltd. "Snow tex-PS" series etc. is specifically mentioned. [of make]

[0093] As for the hydrophilic layer B, it is desirable that it is alkalinity in the state of coating liquid. As a product name, "Snow tex-PS-S (the mean particle diameter in the condition of having connected is about 110nm)", There are "Snow tex-PS-M (the mean particle diameter in the condition of having connected is about 120nm)", and "Snow tex-PS-L (the mean particle diameter in the condition of having connected is about 170nm)." The acid products corresponding to these are "Snow tex-PS-S-O", "Snow tex-PS-M-O", and "Snow tex-PS-L-O", respectively. Among these, when "Snow tex PS-S", "Snow tex PS-M", and "Snow tex PS-L" which are alkalinity are used, even when there is much printing number of

sheets, generating of a greasing is controlled, and it is especially desirable.

[0094] Moreover, alkaline necklace-like colloidal silica can be used also for the hydrophilic layer which is one mode of this invention and which has the concavo-convex structure of 0.1-50-micrometer pitch on a front face.

[0095] In order to prevent generating of the greasing at the time of stenciling, it is desirable to use alkaline necklace-like colloidal silica.

b. As an additive to a porosity silica or a porosity-ized aluminosilicate particle hydrophilic-property layer, a porosity silica or a porosity aluminosilicate particle is mentioned.

[0096] Generally a porosity silica particle is manufactured by the wet method or dry process. With a wet method, it can obtain by grinding the sediment which dried the gel neutralized and obtained, and ground the silicate water solution, or neutralized and deposited. With dry process, a silicon tetrachloride is burned with hydrogen and oxygen and it is obtained by depositing a silica. These particles can control porosity and particle size by adjustment of manufacture conditions.

[0097] As a porosity silica particle, especially the thing obtained from the gel of a wet method is desirable. A porosity aluminosilicate particle is manufactured by the approach indicated by JP,10-71764,A. That is, it is the amorphous complex particle compounded by the hydrolyzing method by using an aluminum alkoxide and a silicon alkoxide as a principal component. The alumina in a particle and the ratio of a silica can be compounded in 1:4-4:1. Moreover, what added the alkoxide of other metals and was manufactured as a complex particle of three or more components at the time of manufacture can be used for this invention. These complex particles can also control porosity and particle size by adjustment of manufacture conditions.

[0098] As porosity of a particle, in the condition before distribution, it is desirable that they are 1.0 or more ml/g in pore volume, it is more desirable that they are 1.2 or more ml/g, and it is still more desirable that they are 1.8-2.5 or less ml/g.

[0099] water retention is so good that pore volume is closely connected with the water retention of a paint film and pore volume is large -- becoming -- the time of printing -- dirt -- hard -- amount of water -- although latitude also becomes large, since the grain child itself which becomes larger than 2.5 ml/g becomes very weak, the endurance of a paint film falls. the case where pore volume is less than 1.0 ml/g -- the dirt hard at the time of printing, and amount of water -- the size of latitude becomes inadequate.

[0100] the condition of containing in the hydrophilic layer as a particle size -- (-- the case where it passes through a distributed crushing process -- including --) -- it is desirable that it is 1 micrometer or less substantially, and it is still more desirable that it is 0.5 micrometers or less. If a big and rough particle exists, a steep projection will be formed in a hydrophilic layer front face by porosity, ink becomes easy to remain in the perimeter of a projection, and non-streak section dirt deteriorates.

c. A zeolite particle zeolite is a crystalline aluminosilicate and is a porous body which has the opening of a regular three-dimensional network whose pole diameter is 0.3-1nm. The general formula which set nature and permutite is expressed as follows.

[0101] $(M_1, M_2)_{1/2} m(Al_mSi_nO_2 (m+n)) \cdot xH_2O$ -- here M_1 and M_2 are the cations of convertibility. M_1 Li^+ , Na^+ , K^+ , It is Tl^+ , Me_4N^+ (TMA), Et_4N^+ (TEA), Pr_4N^+ (TPA), $C_7H_{15}N_2^+$, $C_8H_{16}N^+$, etc., and M_2 is calcium $^{2+}$, Mg $^{2+}$, Ba $^{2+}$, Sr $^{2+}$, C $_{8}H_{18}N_2^{2+}$, etc. Moreover, it is $n \geq m$ and one or less is, the value, i.e., ** aluminum/Si ratio, of m/n . Since many amounts of a convertibility cation are contained so that an aluminum/Si ratio is high, a polarity is high, therefore a hydrophilic property is also high.

Desirable aluminum/Si ratios are 0.4-1.0, and are 0.8-1.0 still more preferably. x expresses an integer.

[0102] As a zeolite particle used by this invention, the aluminum/Si ratio is stable, and comparatively sharp permutite of particle size distribution is desirable, for example, zeolite A:Na $_{12}$ (aluminum $_{12}$ Si $_{12}$ O $_{48}$) and the 27H $_2$ O;aluminum/Si ratio 1.0, zeolite X:Na $_{86}$ (aluminum $_{86}$ Si $_{106}$ O $_{384}$) and a 264H $_2$ O;aluminum/Si ratio 0.811, and zeolite Y:Na $_{56}$ (aluminum $_{56}$ Si $_{136}$ O $_{384}$) and 250H $_2$ O;aluminum/Si ratio 0.412 grade are mentioned.

[0103] containing the high porosity particle of the hydrophilic property whose aluminum/Si ratios are 0.4-1.0 -- the hydrophilic property of the hydrophilic layer itself -- large -- improving -- the time of printing -- dirt -- hard -- amount of water -- latitude also becomes large. Moreover, the dirt of the

remains of a fingerprint is also improved greatly. As for a hydrophilic property, less than 0.4 are [an aluminum/Si ratio] insufficient, and the improvement effect of the above-mentioned engine performance becomes small.

[0104] the condition of containing in the hydrophilic layer as a particle size -- (-- the case where it passes through a distributed crushing process -- including --) -- it is desirable that it is 1 micrometer or less substantially, and it is still more desirable that it is 0.5 micrometers or less.

[0105] If a big and rough particle exists, a steep projection will be formed in a hydrophilic layer front face by porosity, ink becomes easy to remain in the perimeter of a projection, and non-streak section dirt deteriorates.

[0106] Besides these, a metallic-oxide particle with larger mean particle diameter than 100nm and an organic substance particle (for example, an alginic-acid calcium particle, a crystalline cellulose fiber particle) can also be used.

[0107] As for the content of these porosity-sized material, it is desirable that it is 30 to 95 mass [of the whole hydrophilic layer B] %, and it is more desirable that it is 50 to 90 mass %.

- Containing a metallic-oxide particle with a mean particle diameter of 100nm or less in the metallic-oxide particle hydrophilic-property layer B with a mean particle diameter of 100nm or less, this metallic-oxide particle has a role of an inorganic binder in the hydrophilic layer B. As this metallic-oxide particle, colloidal silica, alumina sol, a titania sol, and the sol of other metallic oxides are mentioned. As a gestalt of this metallic-oxide particle, the shape of a globular shape, a needle, and feathers and which other gestalten are sufficient. As mean particle diameter, it is desirable that it is 3-100nm, and the metallic-oxide particle which is several sorts from which mean particle diameter differs can also be used together. Moreover, surface treatment may be made on the particle front face.

[0108] The use as a binder is possible for the above-mentioned metallic-oxide particle using the film formation nature. Using the organic binder, there are few falls of a hydrophilic property and they are [rather than] suitable for the use to a hydrophilic layer. Also in the above, even if especially colloidal silica is low-temperature desiccation conditions comparatively, film formation nature can use it preferably in that it is high.

[0109] As for colloidal silica, bonding strength becomes strong, so that particle diameter is small. As for the mean particle diameter of the colloidal silica used for this invention, it is desirable that it is 1-50nm, and it is still more desirable that it is 3-20nm. Moreover, as mentioned above, in colloidal silica, since the effectiveness that an alkaline thing controls greasing generating is high, especially the thing for which alkaline colloidal silica is used is desirable.

[0110] The "Snow tex -20 (particle diameter of 10-20nm)" by the Nissan chemistry company as alkaline colloidal silica which has mean particle diameter in this range, "The Snow tex -30 (particle diameter of 10-20nm)", the "Snow tex -40 (particle diameter of 10-20nm)", "Snow tex-N (particle diameter of 10-20nm)", "Snow tex-S (particle diameter of 8-11nm)", and "Snow tex-XS (particle diameter of 4-6nm)" are mentioned.

[0111] As for the ratio of a metallic-oxide particle with an above-mentioned mean particle diameter [porosity-sized material / mean particle diameter] of 100nm or less, 95 / 5 - 5/95 are desirable, 80 / 20 - 20/80 are more desirable, and 70 / 30 - 30/70 are still more desirable.

- Although water-soluble polysaccharide starches, celluloses, Pori uronic acid, etc. are usable, celluloses, such as a methyl cellulose salt, a carboxymethyl-cellulose salt, and a hydroxyethyl cellulose salt, are especially desirable, and sodium salt and ammonium salt of a carboxymethyl cellulose are more desirable.

[0112] When these celluloses are used as a water solution with the alkaline above-mentioned necklace-like colloidal silica and colloidal silica with a mean particle diameter of 100nm or less, they produce phase separation with the solid content concentration rise at the time of spreading desiccation, and can form the front face which has regular concavo-convex structure.

[0113] As for these additions, it is desirable that it is 0.1 to 10 mass % to the whole solid content of coating liquid, and it is more desirable that it is 0.5 to 5 mass %. Under in 0.1 mass %, concavo-convex structure organization potency is not discovered, and when [than 10 mass %] more, the water resisting

property of the layer after desiccation deteriorates.

(Material which can add other) In addition to this, a material which is listed to below can be made to contain.

- The conjugated diene system polymer latex of water soluble resin, for example, polyvinyl alcohol, silyl denaturation polyvinyl alcohol, cation denaturation polyvinyl alcohol, polyethylene oxide, polypropylene oxide, a polyethylene glycol (PEG), polyvinyl ether, a styrene-butadiene copolymer, and a methyl methacrylate-butadiene copolymer, an acrylic polymer latex, a vinyl system polymer latex, polyacrylamide, a polyvinyl pyrrolidone, etc. are mentioned, and PEG is desirable also especially among these.

[0114] Moreover, cationic resin may be contained in a layer. As cationic resin, polyalkylene polyamine, such as a polyethylene amine and polypropylene polyamine, or the derivative of those, the acrylic resin that has the 3rd class amino group and the 4th class ammonium, a JIAKURIRU amine, etc. are mentioned. Cationic resin may be added with a particle-like gestalt. As for this, the cationic micro gel of a publication is mentioned to JP,6-161101,A.

[0115] Furthermore, a cross linking agent may be added in a layer. As a cross linking agent, melamine resin, an isocyanate compound, isoxazoles, aldehydes, N-methylol compound, a dioxane derivative, an activity vinyl compound, an activity halogenated compound, etc. can be mentioned, for example.

- Although the porosity particle mentioned as a material which can be added in Layer A as mat material mat material is usable, in order to raise the abrasion resistance of the hydrophilic layer B in addition to it, a with a new Mohs hardness of five or more inorganic particle can also be added. As a with a new Mohs hardness of five or more inorganic particle, the metallic-oxide particles (silica, alumina, titania, zirconia, iron-oxide, chrome oxide, etc.) metallurgy group carbide particle which is not porosity, for example, a boron nitride (silicon carbide etc.) particle, a diamond particle, etc. are mentioned. The particle of a particle near [it being / direction / desirable, for example, not having the acute angle angle] globular forms, such as a fused silica particle and a milt balun particle, is desirable.

[0116] As an index of not being porosity, it is desirable that specific surface area is below 50m²/g in a BET value, and it is still more desirable that it is below 10m²/g.

[0117] Moreover, as for mean particle diameter, it is desirable that it is 1 to 2 twice the thickness of the hydrophilic layer B, and it is still more desirable that they are 1.1 to 1.5 times. Moreover, it is desirable that particle size distribution are sharp, it is desirable that 60% or more of the whole is contained in the 0.8 to 1.2 times as much range as mean particle diameter, and it is desirable that a twice [more than] as many particle as mean particle diameter is 5% or less further.

[0118] As a content of a with a new Mohs hardness of five or more inorganic particle, it is desirable that it is 0.1 to 20 mass [of the whole hydrophilic layer B] %, and it is more desirable that it is 0.5 to 10 mass %.

- A stratified mineral particle may be contained in the stratified mineral particle hydrophilic-property layer B, and clay minerals, such as a kaolinite, halloysite, talc, smectites (a montmorillonite, beidellite, hectorite, slowdown night, etc.), a vermiculite, a mica (mica), and a chlorite, and a hydrotalcite, stratified Pori silicates (a money dynamite, MAKATAITO, eye alite, MAGADIAITO, KENYAAITO, etc.), etc. are mentioned to it as this stratified mineral particle. Especially, a polarity is so high that the density of electric charge of a unit layer (unit layer) is high, and a hydrophilic property is also considered to be high. As the desirable density of electric charge, it is 0.6 or more still more preferably 0.25 or more. As a stratified mineral which has such the density of electric charge, a smectite (density of electric charge 0.25-0.6; negative charge), a vermiculite (density of electric charge 0.6-0.9; negative charge), etc. are mentioned. Especially a synthetic fluorine mica can obtain the thing of the quality stabilized [particle size], and is desirable. Moreover, what is bloating tendency is desirable also in a synthetic fluorine mica, and what is free swelling is still more desirable.

[0119] Moreover, the intercalation compounds (pillared crystal etc.) of the above-mentioned stratified mineral, the thing which performed ion exchange treatment, and the thing which performed surface preparation (silane coupling processing, compound-ized processing with an organic binder, etc.) can also be used.

[0120] the condition of containing in the layer as size of a plate-like stratified mineral particle -- (-- the case where it passes through a swelling process and a distributed exfoliation process -- including --) -- it is desirable that mean particle diameter (maximum length of a particle) is 20 micrometers or less, and average aspect ratios (thickness of the maximum length/particle of a particle) have the shape of 20 or more thin layer, mean particle diameter is 10 micrometers or less, and it is still more desirable that an average aspect ratio is 50 or more. When grain size is in the above-mentioned range, the continuity and flexibility of the direction of a flat surface which are the description of a thin layer-like particle are given to a paint film, and it can consider as a tough paint film by dryness that a crack cannot enter easily. If particle diameter separates from the above-mentioned range, the crack depressor effect depended for scratching may fall. Moreover, when an aspect ratio is below the above-mentioned range, flexibility may become inadequate and the crack depressor effect by the scratch may fall similarly.

[0121] As a content of a stratified mineral particle, it is desirable that it is one to 95 mass % [of the whole layer] %, and it is more desirable that it is three to 80 mass %. Since especially a bloating tendency composition fluorine mica is an ultra-thin layer particle, effectiveness is seen also by little addition. A stratified mineral particle may be added after passing through a below-mentioned distributed exfoliation process and a below-mentioned swelling process.

- The material 1 hydrophilic-property layer B can be made to contain a material 1. By adding a material 1 in the hydrophilic layer B, the function to assist the image formation by Layer A can be given.

[0122] As an addition of a material 1, 0 - 30 mass % is desirable, and 1 - 15 mass % is more desirable. Although an image formation miscellaneous function comes to be discovered more with the increment in an addition, when and it stencils than 30 mass %, there is concern of greasing generating of the non-image section.

- The material 2 hydrophilic-property layer B can be made to contain a material 2. The effectiveness of reducing blanket dirt is acquired by adding a material 2 in the hydrophilic layer B.

[0123] As an addition of a material 2, it is desirable that it is zero to 10 mass %, and it is more desirable that it is one to 5 mass %. If [than 10 mass %] more, the water resisting property of the hydrophilic layer B will deteriorate.

- A silicate water solution can also be used as a binder added in the binder hydrophilic-property layer of a silicate water solution. Alkali-metal silicates, such as silicic-acid Na and silicic-acid K and a silicic acid Li, are desirable, and the SiO₂/M₂O ratio is desirable when choosing so that it may become the range where pH of the whole coating liquid at the time of adding a silicate does not exceed 13 prevents the dissolution of an inorganic particle.

- As a binder added in the binder hydrophilic-property layer of inorganic [by the sol-gel method], or organic-inorganic hybrid, the inorganic polymer or organic-inorganic hybrid polymer by the so-called sol-gel method can be used. About formation of the inorganic polymer by the sol-gel method, or organic-inorganic hybrid polymer, the well-known approach indicated by the reference which is indicated by "application of a sol-gel method" (the Sumio Sakuhana work / company issue of the AGUNE ** style), for example, or is quoted by this book can be used.

- A surfactant water-soluble for the purpose, such as a surfactant spreading nature improvement, can be made to contain. It is desirable to use the surfactant of a silicon system or a fluorine system especially. The content of this surfactant has desirable 0.01 - 3 mass % of the whole hydrophilic layer B, and its 0.03 - 1 mass % is still more desirable.

- Even if the above organic components contained in the content hydrophilic-property layer of an organic component are resin of a metaphor hydrophilic property, in order that they may raise endurance, a water resisting property, etc., when a bridge is made to construct, a hydrophilic property falls greatly and causes dirt at the time of printing. moreover -- that an organic component plugs up opening of a porosity particle **** -- a hole -- the porosity of a hydrophilic layer may be spoiled by permeating inside, and water retention may be reduced. Little direction of the addition of the above reason to an organic component is desirable. Specifically, the amount of the organic component to the whole hydrophilic layer B is 1 - 20% still more preferably 1 to 30% more preferably 0.1 to 50% in a mass ratio.

<Layer C> In using the ink which contains an acid as ink for record, it uses the charge of a printing plate which it layer C Has instead of Layer A on a base material.

[0124] It is characterized by Layer C containing the material 3 which changes with acids from water solubility to water-insoluble nature.

- Although any materials can be used if it is the material which changes with material 3 acids from water solubility (in the range of three or less pH) to water-insoluble nature, it is desirable to use water-soluble above-mentioned protein or a water-soluble above-mentioned glycoprotein for this invention.

[0125] As a content of a material 3, it is desirable that it is 20 to 100 mass [of whole layer C] %, and it is more desirable that it is 40 to 100 mass %.

- As for the oligosaccharide layer C, it is desirable to contain the above-mentioned oligosaccharide for the purpose which makes water development nature better in addition to this. As a class of oligosaccharide, the above-mentioned thing can use it preferably.

[0126] As a content of an oligosaccharide, it is desirable that it is one to 80 mass [of whole layer C] %, and it is more desirable that it is ten to 80 mass %.

- "The material which can add other" and material 1a which were indicated in the term of Layer A in addition to this can be added.

<Base material> As a base material, the well-known ingredient used as a substrate of the printing version can be used. For example, the paper processed with a metal plate, plastic film, polyolefine, etc., the compound base material which stuck the above-mentioned ingredient suitably are mentioned. Although it is not restricted as thickness of a base material especially if installation to a printing machine is possible, generally it is easy to deal with a 50-500-micrometer thing.

[0127] As a metal plate, although iron, stainless steel, aluminum, etc. are mentioned, aluminum is desirable especially from the relation between specific gravity and rigidity. An aluminum plate is used after degreasing with alkali, an acid, a solvent, etc., in order to remove the oil used at the time of rolling and rolling up which usually exists in the front face. Especially as cleaning processing, cleaning by the alkali water solution is desirable. Moreover, in order to raise an adhesive property with a spreading layer, it is desirable to carry out easily-adhesive processing and under coat spreading to a spreading side. For example, after being immersed in the liquid containing coupling agents, such as a silicate and a silane coupling agent, or applying liquid, the method of performing sufficient desiccation is mentioned. Anodizing is also considered to be a kind of easily-adhesive processing, and can be used. Moreover, it can also be used combining anodizing, the above-mentioned immersion, or spreading processing. Moreover, the aluminum plate by which surface roughening was carried out by the well-known approach can also be used.

[0128] As plastic film, polyethylene terephthalate, polyethylenenaphthalate, polyimide, a polyamide, a polycarbonate, polysulfone, polyphenylene oxide, and cellulose ester can be mentioned. Especially polyethylene terephthalate and polyethylenenaphthalate are desirable. As for these plastic film, it is desirable to carry out easily-adhesive processing and under coat spreading to a spreading side in order to raise an adhesive property with a spreading layer. As easily-adhesive processing, corona discharge treatment, flame treatment, plasma treatment, UV irradiation processing, etc. are mentioned. Moreover, the layer containing gelatin or a latex etc. is mentioned as an under coat. Moreover, a water osmosis prevention layer like a vinylidene chloride as an under coat may be prepared, the water osmosis prevention layer by vacuum evaporation of aluminum or silicon may be prepared further, and the above under coats may be further prepared on a vacuum evaporation layer.

[0129] Moreover, although the above-mentioned ingredient is stuck suitably and used as a compound base material, it may stick, after sticking before forming a hydrophilic layer, and forming a hydrophilic layer, and just before attaching in a printing machine, it may stick.

[2] The manufacture approaches of the charge of a printing plate (distributed process etc.)

a. It can roughly divide into distributed crushing of a porosity particle, distributed crushing of the distributed exfoliation process particle of a stratified mineral particle, or layer exfoliation dry type and wet. Although it becomes comparatively simple [a process] in dry-type distributed crushing since the desiccation process is unnecessary, wet one is usually advantageous to distributed crushing to submicron

order, and layer exfoliation to thickness 100nm or less.

[0130] As dry-type distributed shredding equipment, a high-speed rotation impact shear type mill (for example, ANYURA type INOMAIZA), an air-current type grinder (jet mill), a roll type mill, a dry-type medium agitation mill (for example, ball mill), a compression shearing-die grinder (for example, on-GUMIRU), etc. can be used. As wet distributed shredding equipment, a wet medium agitation mill (for example, a ball mill, an AKUA mizer), a high-speed rotating type shear friction type mill (for example, colloid mill), etc. can be used.

[0131] As for the particle size of the porosity particle after distributed crushing, it is desirable that it is 1 micrometer or less substantially, and it is still more desirable that it is 0.5 micrometers or less. Moreover, when a big and rough particle remains, classification or filtration may remove. Moreover, as for the stratified mineral particle after distributed crushing, it is desirable that mean particle diameter (maximum length of a particle) is 20 micrometers or less, and average aspect ratios (thickness of the maximum length/particle of a particle) have the shape of 20 or more thin layer, mean particle diameter is 10 micrometers or less, and it is still more desirable that an average aspect ratio is 50 or more. Moreover, the swelling process later mentioned before distributed crushing of a stratified mineral particle may be performed. When especially wet distribution is performed, it is desirable to adjust coating liquid, without drying a porosity particle and a stratified mineral particle. When the particle which performed distributed crushing or distributed exfoliation is dried, it is because re-condensation may be produced. In order to adjust the solid content concentration of coating liquid, you may perform condensing or diluting. Furthermore, in the above-mentioned distributed crushing or a dispersion layer exfoliation process, surface treatment can also be performed to a particle by adding a finishing agent. Moreover, in the above-mentioned distributed crushing or a dispersion layer exfoliation process, other components which may add other components added to coating liquid, and may distribute to coincidence, or are added to coating liquid after the above-mentioned distributed crushing or a dispersion layer exfoliation process may be added, and you may distribute again. In distributed crushing or a dispersion layer exfoliation process, it is thought that the mechanochemical reaction has occurred in coincidence, and when it distributes to other components and coincidence which are added to coating liquid, the improvement effectiveness in on the strength at the time of becoming a paint film may be acquired.

b. The bloating tendency composition fluorine mica which is swelling process free swelling of a stratified mineral particle also fully swells mixing and stirring with water, and serves as dispersion liquid divided and stabilized in the thin layer 10nm or less by average thickness.

[0132] Mg-vermiculite comes to show bloating tendency by performing the following ion exchange treatment, for example.

[0133]

Mg-vermiculite + lithium citrate aq

->Li-vermiculite + magnesium citrate aq

Furthermore, it becomes possible to divide Li-vermiculite which carried out limited swelling with osmotic pressure even to a thin layer with an average thickness of 10nm or less by distributing and layer exfoliating mechanically.

c. When using material 1b supplied as dissolution process fine particles to the water of material 1b, after mixing the fine particles of other water-soluble addition materials, for example, the fine particles of a material 2 and other polysaccharide fine particles, and water-soluble-resin fine particles in the state of fine particles, it is desirable to dissolve in water and to consider as a water solution. When dissolving only the fine particles of material 1b in water, that it is easy to produce a pellet etc., the dissolution is difficult, and in order to require long duration, it leads to a manufacturing-cost rise. Moreover, it is also difficult to consider as a high-concentration water solution.

[0134] If it considers as the fine particles which mixed each fine particles 50 mass % every and is made to dissolve in water by the approach of this invention when using ovalbumin fine particles as material 1b and using trehalose fine particles as a material 2, adjustment also of the comparatively high-concentration water solution of 15 mass % will be attained easily.

(Layer spreading process) In spreading of Layer A, after mixing a material 1, and the saccharide at large and/or and water-soluble-resin fine particles of the fine particles of the material 2 which are water solubility and crystallinity and has the melting point in the range of 60-300 degrees C, and others in the state of fine particles, it is desirable to dissolve in water, to make it apply and dry and to form Layer A on a base material, as aqueous coating liquid. When dissolving only the fine particles of water-soluble protein and/or a water-soluble glycoprotein in water, that it is easy to produce a pellet etc., the dissolution is difficult, and in order to require long duration, it leads to a manufacturing-cost rise. moreover -- the coating liquid of Layer A is also thin difficult [it / to consider as a high-concentration water solution] (3 mass % is also difficult) therefore -- not becoming -- it does not obtain, but the desiccation load for the increment in wet thickness of spreading etc. is added, and total productivity falls greatly.

[0135] For example, in the case where the fine particles which mixed water-soluble protein fine particles and ovalbumin fine particles with trehalose fine particles 50 mass % every are used, adjustment also of the comparatively high-concentration water solution of 15 mass % is attained easily.

[0136] It is desirable at the time of spreading desiccation of Layer A to make it dry on conditions without contained melting or coagulation of a material 1 (material 1a and/or material 1b) and a material 2. 20-80 degrees C is specifically desirable, and 40-60 degrees C is more desirable. Although the drying time can be suitably set up according to the desiccation conditions of airflow and others, 0.1 - 60 minutes is desirable and 0.5 - 10 minutes is more desirable. Although it is possible to also make it dry at temperature higher than the above-mentioned temperature requirement, in that case, it is desirable that the time amount exposed to the temperature is 5 or less minutes, it is more desirable that it is 1 or less minute, and it is still more desirable that it is 0.5 or less minutes. When it contains especially material 1b, as for material 1b, in the state of a water solution, it is desirable that the time amount exposed to an elevated temperature in the wet condition is short in order to start coagulation at temperature lower than dryness.

[0137] In spreading of the hydrophilic layer B, it can dry in the temperature requirement which is not accompanied by combustion of the material contained when it does not contain a material 1, and does not have a bad influence in a base material. It is specifically 40-200 degrees C, and 60-150 degrees C is more desirable.

[0138] When it contains a material 1, as for desiccation conditions, it is desirable that it is the same as that of Layer A. Moreover, since the hydrophilic layer B forms concavo-convex structure by the phase separation of the content material at the time of spreading desiccation, it can control concavo-convex structure also by desiccation conditions. Since this has the drying-temperature range desirable as mentioned above according to the class of material to contain, it is desirable to perform control of concavo-convex structure suitably by change of airflow etc.

[0139] Spreading formation is fundamentally possible for Layer C like Layer A. Moreover, each class can perform ageing processing suitably after [all] layer spreading individually in order of spreading. When the material 1 is not contained in which layer, as for ageing processing, it is desirable to carry out at 40-150 degrees C for 1 minute to 200 hours. Moreover, when it contains a material 1 in which layer, it is desirable to carry out at 40-60 degrees C for 1 to 200 hours.

[3] As the image formation approach image formation approach, the two following modes by the ink jet method are mentioned.

[0140] The first mode is the approach of performing image formation, by giving the image the ink which contains a light-and-heat conversion material with an ink jet method on the charge front face of a printing plate which has Layer A, recording an image, exposing the whole surface subsequently with the light which has the absorption wavelength of said light-and-heat conversion material, making water make insoluble a part of layer [at least] A of the Records Department, and removing the non-Records Department of Layer A using water.

[0141] as a light-and-heat conversion material -- a color (light-and-heat conversion material meltable in water), and a pigment (light-and-heat conversion material insoluble in water) -- although any are sufficient and especially distribution of absorption-of-light wavelength is not limited, either, the material

which presents black by the light, and the material which has the peak of absorption wavelength in near-infrared - infrared rays are desirable.

[0142] As an example of a color of having the peak of absorption wavelength, the organometallic complex of organic compounds, such as the common cyanine system coloring matter which is infrared-absorption coloring matter, crocodile NIUMU system coloring matter, poly methine system coloring matter, AZURENIUMU system coloring matter, SUKUWARIUMU system coloring matter, thio pyrylium system coloring matter, naphthoquinone system coloring matter, and anthraquinone system coloring matter, a phthalocyanine system, a naphthalocyanine system, an azo system, a thioamide system, a dithiol system, and the India aniline system etc. is mentioned to near-infrared - infrared rays. Specifically, the compound of a publication is mentioned to JP,63-139191,A, 64-33547, JP,1-160683,A, 1-280750, 1-293342, 2-2074, 3-26593, 3-30991, 3-34891, 3-36093, 3-36094, 3-36095, 3-42281, 3-97589, 3-103476, etc. These can be used combining a kind or two sorts or more.

[0143] As other colors, the material which presents black, such as azo dye, anthraquinone, and quinone imine, can be used, for example. As a presentation of color ink, what is indicated by WO 98/No. 46685, for example (black ink) is usable.

[0144] As an example of a pigment, carbon black, graphite, black titanium oxide, etc. are usable. It is in the condition distributed in ink, and a thing 10 micrometers or more does not exist substantially, and the particle size of a pigment needs to be smaller than the diameter of a nozzle of an ink jet head (usually 10-50 micrometers), and it is [it is desirable that it is 1 micrometer or less in mean particle diameter, and / it is 0.1 micrometers or less, and] still more desirable that it is larger than the average pole diameter (specifically 5-50nm) of the hydrophilic layer B. As a presentation of pigment ink, what is indicated by JP,11-279470,A, for example (black ink) is usable.

[0145] Although it is possible to use both aquosity oiliness and thermofusion nature (the so-called solid) as ink containing said light-and-heat conversion material, since Layer A is water solubility, it is more desirable to use the water color ink which Layer A is dissolved in part with the solvent of ink, and can distribute a light-and-heat conversion material in Layer A.

[0146] When a light-and-heat conversion material is a color, this light-and-heat conversion material may be made to permeate not only the layer A but the hydrophilic porosity layer B. The whole layer of the image section can be made to generate heat at the time of exposure by distributing a light-and-heat conversion material over the whole layer on a base material. Since it is necessary to generate heat near the interface of Layer A and Layer B especially in order to obtain image reinforcement, and the layer A near the interface needs to fuse, as for the color ink containing a light-and-heat conversion material, it is desirable to make a part of layer B permeate at least.

[0147] On the other hand, when a light-and-heat conversion material is a pigment, it is desirable that the mean particle diameter in the distributed condition of the pigment is larger than the average pole diameter which the hydrophilic layer B has as mentioned above. If the mean particle diameter of a pigment is larger than the average pole diameter of the hydrophilic layer B, since it deposits on the surface of the hydrophilic layer B and only the solvent of ink permeates the hydrophilic layer B, a blot of an image will be controlled and resolution of parts [many] of a pigment will improve.

[0148] Moreover, the charge of a printing plate (which layer formed on a base material and/or a base material) itself can also be made to carry out the amount content of fitness of the light-and-heat conversion material in this method. In this case, since the whole surface generates heat to extent which does not produce water insolubilization of Layer A and the calorific value of the ink jet Records Department is also added at the time of the complete exposure after ink jet image recording, the sensibility of the charge of a printing plate can be raised.

[0149] Although not limited as a presentation of said water color ink especially except containing the light-and-heat conversion material, the well-known material contained in the binder, the surface active agent, and the other water color ink for ink jets of a water-soluble polymer and others can be made to contain.

[0150] before the process which exposes Layer A completely after carrying out ink jet record -- and/or, the desiccation process of the ink by heat and/or the wind can also be established before the process

which removes the non-Records Department of Layer A using water. As for the temperature of the layer A in this desiccation process, it is desirable that a material 1 is kept lower than the temperature which carries out water insolubilization.

[0151] As the exposure approach, the complete exposure by flash plate light, such as a xenon flash tube, is mentioned, for example. Exposure conditions can be adjusted with parameters, such as power of the light source, distance to the light source, flash plate lighting time amount, and a count of flash plate lighting. As an example of such equipment and an approach, the equipment and the approach which are indicated by JP,11-291481,A, for example are applicable. Moreover, when the ink containing the high temperature conversion material which has absorption in near-infrared - infrared is used, exposing completely with an infrared laser aligner is also possible. Although it is desirable to carry out to the field in which Layer A was formed as for exposure, when a base material is a material with the low absorbance of exposure wavelength (for example, highly transparent resin film etc.), exposing from a base material side side is also possible.

[0152] The second mode is the approach of performing image formation, by giving the image the ink which contains an acid with an ink jet method on the charge front face of a printing plate which has Layer C, recording an image, making water make insoluble a part of layer [at least] C of the Records Department, and removing the non-Records Department of Layer C using water.

[0153] Although water color ink is mentioned as ink containing said acid and especially the acid to contain is not limited, an acetic acid, a phosphoric acid, a hydrochloric acid, a sulfuric acid, etc. can be used. It is desirable that it is six or less as pH of ink, and it is more desirable that it is the range of 1.2-4. Ink can be made to contain the well-known material contained in addition to this in coloring agents, such as a color and a pigment, the binder of a water-soluble polymer and others, a surface active agent, and the other water color ink for ink jets. After recording in the ink containing an acid, the desiccation process of the ink by heat and/or the wind can also be established before the process which removes the non-Records Department of Layer C using water. When Layer C contains water-soluble protein and/or a water-soluble glycoprotein, it is desirable that the temperature of the layer C in said desiccation process is kept lower than the denaturation temperature of water-soluble protein and/or a water-soluble glycoprotein.

[0154] In this invention, performing the process which removes the non-recorded part of the above-mentioned layer A or Layer C using water on a printing machine can perform image formation now by process loess substantially, and it is desirable.

[0155] Although especially the method of removing the non-recorded part of Layer A or Layer C using water on a printing machine is not limited, it is desirable to carry out by contacting a dampening water roller in the charge of a printing plate, and supplying dampening water, attaching in the printing cylinder of a printing machine the charge of a printing plate mentioned above, and rotating a printing cylinder. In that case, simultaneous, timing can be shifted, an inking roller and a blanket drum may be contacted to a printing cylinder (charge of a printing plate), and a removal process may be performed, performing the usual printing. Furthermore, you may clean by pressing cleaning members, such as a nonwoven fabric, against a printing cylinder (charge of a printing plate), and/or a blanket drum at the above and coincidence.

[0156]

[Example] Although an example is given and this invention is hereafter explained to a detail, the mode of this invention is not limited to this. In addition, unless especially the "section" has a notice in below, "the mass section as an active principle" is expressed.

[0157] The under coat which becomes a PET film with a formation thickness [of the production and the under coat of example 1 base material] of 0.18mm from a bilayer by the following approaches was formed.

1) After performing corona discharge treatment to the spreading side of a first under coat PET base material, the coating liquid of the following presentation was applied so that the thickness after desiccation might be set to 0.4 micrometers with a wire bar under 20 degrees C and the ambient atmosphere of 55% of relative humidity. Then, desiccation was performed for 2 minutes at 140 degrees

C.

- The first under coat presentation Acrylic latex particle: n-butyl acrylate / t-butyl acrylate /styrene / hydroxyethyl methacrylate =28/22/25/25 36.9g Surfactant (A) 0.36g Hardening agent (a) Distilled water was added to 0.98g or more, and it was referred to as 1000ml, and considered as coating liquid.

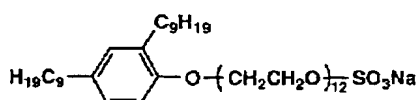
2) After performing corona discharge treatment to the field in which the first under coat of the second under coat above-mentioned film was formed, the coating liquid of the following presentation was applied so that the thickness after desiccation might be set to 0.1 micrometers with the Ayr knife method under 35 degrees C and the ambient atmosphere of 22% of relative humidity. Then, desiccation was performed for 2 minutes at 140 degrees C.

- The second under coat presentation Gelatin 9.6g Surfactant (A) 0.4g Hardening agent (b) Distilled water was added to 0.1g or more, and it was referred to as 1000ml, and considered as coating liquid.

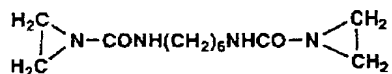
[0158]

[Formula 1]

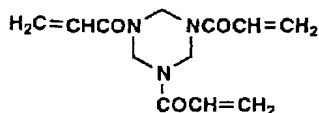
界面活性剤(A)



硬膜剤(a)



硬膜剤(b)



[0159] - Ink 1 (acid content ink)

After mixing and stirring the following material, it filtered using the metal mesh filter which has about 5-micrometer aperture, and ink 1 was produced.

[0160]

Acid: Phosphoric acid 3.0g Ultrapure water 97.0g and ink 2 (acid content ink / low concentration)

Ink 2 as well as ink 1 was produced except having changed the presentation into below.

[0161]

Acid: Phosphoric acid 1.5g Ultrapure water 97.0g and ink 3 (color black ink)

Ink 3 as well as ink 1 was produced except having changed the presentation into below.

[0162]

light-and-heat conversion material: -- Suminol -- fast -- gray 3G (the Sumitomo Chemical Co., Ltd. make, C.I. acid black 48) 5.0g Ultrapure water 95.0g and ink 4 (color black ink / low concentration)

Ink 4 as well as ink 1 was produced except having changed the presentation into below.

[0163]

light-and-heat conversion material: -- Suminol -- fast -- gray 3G (above) 3.5g Ultrapure water 96.5g and ink 5 (infrared absorption coloring matter ink)

Ink 5 as well as ink 1 was produced except having changed the presentation into below.

[0164]

Light-and-heat conversion material: Phthalocyanine system coloring matter TX-112A (NIPPON SHOKUBAI Co., Ltd. make) 5.0g Ultrapure water 95.0g and ink 6 (infrared absorption coloring matter ink / low concentration)

Ink 6 as well as ink 1 was produced except having changed the presentation into below.

[0165]

Light-and-heat conversion material: Phthalocyanine system coloring matter (above) 3.5g Ultrapure water 96.5g and ink 7 (pigment black ink)

The material shown below was mixed according to the approach indicated by JP,11-279470,A, and the Sand grinder performed distributed processing of 2 hours using the glass bead (HAIBI 20) 1.5 times the mass of this amount of mixture. In addition, a presentation unit is the mass section.

[0166]

FW18 (the product made from Degussa: C.I. pigment black 7)

5.0 Polyamino Acid Derivative Solution (it Indicates to JP,11-279470,A Polyamino Acid Derivative Solution A, Solid Content 25 Mass %) 10.0 Glycerol 5.0 Diethylene glycol 5.0 Ion exchange water The glass bead was removed in a stainless steel mesh after 65.0 distribution termination, and the triethylene glycol monobutyl ether 3 section was added and diluted in the distributed-processing finishing mixture 97 obtained section. After stirring this mixture for further 2 hours, it filtered using the 3-micron MEMPUREN filter, and ink 7 was produced.

- Ink 8 (pigment black ink / low concentration)

Ink 8 was similarly produced except having made the pigment FW18 of ink 7 into the 3.5 mass sections, and having made ion exchange water into the 66.5 mass sections.

Coating liquid was produced by the presentation shown below in production (production of the coating liquid for layer A) of coating liquid. Each coating liquid impressed the supersonic wave for 5 minutes after sufficient stirring, subsequently filtered this, and the thing without especially a publication used it as coating liquid.

- Coating liquid A-1 Material 1a: Carnauba wax emulsion A118 40.0 (the Gifu shellac company make, the mean particle diameter of 0.3 micrometers, the softening temperature of 65 degrees C, the melting point of 80 degrees C, 8cps of 1 40-degree C melt viscosity, solid content 40 mass %) It is pure water to solid content 6 mass %. Diluted dispersion liquid Material 2 : [Disaccharide trehalose fine particles] 60.0 (trade name [by the Hayashibara business-affairs company] TOREHAOSU, melting point of 97 degrees C) Water solution Solid content 6 mass % coating liquid solid content After fully mixing the material 1b fine particles of 6.0 mass % and the coating liquid A-2 following, and material 2 fine particles by fine particles, it added and dissolved, stirring to 25-degree C pure water. After stirring for 10 more minutes after addition termination, the supersonic wave was impressed for 10 minutes and the dissolution was promoted. The solution temperature after ultrasonic impression was 30 degrees C or less. Subsequently, this was filtered and it considered as coating liquid.

[0167]

Material 1b: Ovalbumin fine particles (Wako Pure Chem make) 3.0 Material 2: Disaccharide trehalose fine particles 3.0 (trade name [by the Hayashibara business-affairs company] TOREHAOSU) (Production of the coating liquid for layer C) The ovalbumin fine-particles (Wako Pure Chem industrial company make) 6 mass section was put into the container into which the - coating liquid C-1 pure-water 94 mass section was put, and at 5 degrees C, it put for 24 hours and dissolved. Subsequently, this was filtered and coating liquid C-1 was produced.

- After fully mixing material 3 fine particles and oligosaccharide fine particles of the coating liquid C-2 following by fine particles, it added and dissolved, stirring to 25-degree C pure water. After stirring for 10 more minutes after addition termination, the supersonic wave was impressed for 10 minutes and the dissolution was promoted. The solution temperature after ultrasonic impression was 30 degrees C or

less. Subsequently, this was filtered and it considered as coating liquid.

[0168]

Material 3: Ovalbumin fine particles (Wako Pure Chem make) 4.0 Oligosaccharide: Disaccharide trehalose fine particles 2.0 (trade name [by the Hayashibara business-affairs company] TOREHAOSU)

Pure water 94.0 Coating liquid solid content Each coating liquid B-1 and B-2 were produced by the presentation shown below in 6.0 mass % (production of the coating liquid for hydrophilic layer B). Each coating liquid impressed the supersonic wave for 5 minutes after sufficient stirring, subsequently filtered, and was used as coating liquid. In addition, a presentation unit is the mass section.

- coating liquid B-1 Colloidal silica (alkali system) Snow tex-S (Nissan chemistry company make and solid content 30 mass %) 25.0 Necklace-like colloidal silica (alkali system) Snow tex-PSM (Nissan chemistry company make and solid content 20 mass %) 50.0 Mat material Siluton AMT08 5.0 (the Mizusawa chemistry company make, a porosity aluminosilicate particle, mean particle diameter of 0.6 micrometers)

Pure water 32.5 Coating liquid solid content 20.0 mass % and coating liquid B-2 Colloidal silica (alkali system) Snow tex - S 25.0 (Nissan chemistry company make and solid content 30 mass %)

Necklace-like colloidal silica (alkali system) Snow tex - PSM (Nissan chemistry company make and solid content 20 mass %) 50.0 Mat material Siluton AMT08 4.0 (the Mizusawa chemistry company make, a porosity aluminosilicate particle, mean particle diameter of 0.6 micrometers)

Carboxymethylcellulose sodium salt (reagent by the Kanto chemistry company)

10.0 ***** (Solid Content 3 Mass %)

Pure water 20.0 Coating liquid solid content The charge of a printing plate of samples 1-10 was produced by a base material and lamination as shown in the production table 2 of the charge of a 20.0 mass % printing plate. Moreover, in the front face of the hydrophilic layer B which carried out spreading formation using coating liquid B-2, it was checked as a result of microscope observation that the concavo-convex structure of 0.1-50-micrometer pitch is formed in a front face.

(Image formation process) Image recording was performed in the combination shown in Table 2 to the charge of a printing plate of samples 1-10 by which approach shown below. Removal of the layer A of the image sheep Records Department or Layer C was performed on the printing machine mentioned later.

- Ink jet method 1 (usually black ink)

Seiko Epson ink jet printer :P Ink jet record was performed in the Ath page of the layer of the charge of a printing plate which has Layer A using exclusive ink (black) by M-700C. The used image is a bitmapped image (720dpi) of 8-bit gray scale, and contains the gradation image which changes from the alphabetic character and black of 10pt (point) to white continuously.

[0169] A setup of a printer was performed by [as being the following].

printing quality: -- super fine form class: -- paper ink only for super fine one: -- black halftone: -- high-definition halftone micro weave: -- super bidirectional printing: -- nothing smoothing: -- color correction are and according to a color adjustment:driver Automatic (in addition to this, a setup is a default)

Ink was dried after ink jet record for 1 hour by ordinary temperature normal relative humidity (20 degree C and 60%RH), flash exposure was performed all over the Ath page of the layer by which ink jet record was subsequently carried out by the xenon flash tube, and thermal coagulation of the ink jet Records Department of Layer A was carried out. Flash exposure searched for optimum conditions for every charge of a printing plate, and used for printing evaluation what was exposed by optimum conditions.

- Ink jet method 2 (acid content ink)

In the ink jet method 1, the black ink section of an ink cartridge is filled up with ink 1, except having used the charge of a printing plate which has Layer C, ink jet record was performed similarly and, subsequently ink was dried for 1 hour or more by ordinary temperature normal relative humidity (20 degree C and 60%RH).

- Ink jet method 3 (pigment black ink)

In the ink jet method 1, ink jet record, desiccation, and flash exposure (optimum conditions) were

similarly performed except having filled up the black ink section of an ink cartridge with ink 7.

- Ink jet method 4 (infrared absorption coloring matter ink)

In the ink jet method 1, except having filled up the black ink section of an ink cartridge with ink 5, ink jet record was performed similarly and, subsequently ink was dried for 1 hour by ordinary temperature normal relative humidity (20 degree C and 60%RH). Next, it exposed all over the A-th page of wavelength: the layer by which ink jet record was carried out using the laser aligner of the outside cylinder drum method of 830nm, a 32ch multi-beam, and resolution 4000dpi. Under the present circumstances, a focus is shifted and the beam diameter in a layer A front face was made for the direction of vertical scanning to be set to 20 micrometers. Exposure changed energy by the 50 mj/cm² unit to 200 - 450 mj/cm², performed it, searched for optimum conditions for every charge of a printing plate, and used for printing evaluation what was exposed by optimum conditions.

(Presswork) The charge of a printing plate by which image (latent image) formation was made was printed on condition that coat paper, dampening water (1.5% of H liquid SG[by Tokyo Printing Ink Mfg. Co., Ltd.]-51 concentration), and ink (Toyo Ink TOYO king high echo M red) using the printing machine (DAIYABY Mitsubishi Heavy Industries, Ltd.1 F-1). The usual printing was started after making it rotate as it is for 10 seconds, having contacted only the dampening water roller to the printing cylinder first, and supplying water to the charge front face of a printing plate rotating a printing cylinder at the time of printing initiation.

(Printing evaluation)

- the evaluation profit **** printed matter (printing appearance deer the 500th sheet) of image S/N is observed with viewing and a magnifier, and there is no dirt in the non-streak section, concentration has been in the image section, or it evaluated by making into a viewpoint whether for the profile of the alphabetic character of 10pt to be clear. The obtained result is shown in Table 2.

[0170]

[Table 2]

試料 No.	親水性層 B		層 A または層 C		画像形成方法	画像 S/N 評価
	塗布液 No.	層形成方法	塗布液 No.	層形成方法		
1	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式1	S/N が良好な 印刷物が得られた
2	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式3	S/N が良好な 印刷物が得られた
3	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-2	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式3	S/N が良好な 印刷物が得られた
4	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式4	S/N が良好な 印刷物が得られた
5	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	C-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式2	S/N が良好な 印刷物が得られた
6	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	C-2	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式2	S/N が良好な 印刷物が得られた
7	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式1	S/N が良好な 印刷物が得られた
8	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式3	S/N が良好な 印刷物が得られた
9	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式4	S/N が良好な 印刷物が得られた
10	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間乾燥した	C-2	No.5 のワイヤーバーで 塗布した後、55℃で3分間乾燥した	インクジェット 方式2	S/N が良好な 印刷物が得られた

[0171] It turns out that printed matter with good S/N is obtained from any printing version so that clearly from Table 2.

[0172] The charge of a printing plate of samples 11-15 was produced by a base material and lamination as shown in example 2 (production of the charge of a printing plate) table 3.

(Image formation process) Based on the approach shown below, image recording was performed in combination as shown in Table 3 to the charge of a printing plate of samples 11-15. Removal of the layer A of the image sheep Records Department or Layer C was performed on the printing machine.

- Ink jet method 5 (2 sorts of shade color ink)

Seiko Epson ink jet printer :P Using M-700C, the Magenta ink section of an ink cartridge was filled up with ink 3, the light Magenta ink section was filled up with ink 4, and the other ink sections performed ink jet record in the Ath page of the layer of the charge of a printing plate which removes ink and has Layer A. The used image contains the gradation image which changes from the alphabetic character and Magenta of 10pt of a Magenta to white continuously.

[0173] A setup of a printer was performed by [as being the following].

printing quality: -- super fine form class: -- paper ink only for super fine one: -- color halftone: -- high-definition halftone micro weave: -- super bidirectional printing: -- nothing smoothing: -- color correction are and according to a color adjustment:driver Automatic (in addition to this, a setup is a default)

Ink was dried after ink jet record for 1 hour by ordinary temperature normal relative humidity (20 degree C and 60%RH), flash exposure was performed all over the Ath page of the layer by which ink jet record was subsequently carried out by the xenon flash tube, and thermal coagulation of the ink jet Records Department of Layer A was carried out. Flash exposure searched for optimum conditions for every printing ingredient, and used for printing evaluation what was exposed by optimum conditions.

- Ink jet method 6 (2 sorts of shade acid content ink)

In the ink jet method 5, the Magenta ink section of an ink cartridge is filled up with ink 1, the light Magenta ink section is filled up with ink 2, except having used the charge of a printing plate which has Layer C, ink jet record was performed similarly and, subsequently ink was dried for 1 hour or more by ordinary temperature normal relative humidity (20 degree C and 60%RH).

- Ink jet method 7 (2 sorts of shade pigment ink)

In the ink jet method 5, ink jet record, desiccation, and flash exposure (optimum conditions) were similarly performed except having filled up the Magenta ink section of an ink cartridge with ink 7, and having filled up the light Magenta ink section with ink 8.

- Ink jet method 8 (2 sorts of shade infrared absorption coloring matter ink)

In the ink jet method 5, except having filled up the Magenta ink section of an ink cartridge with ink 5, and having filled up the light Magenta ink section with ink 6, ink jet record was performed similarly and, subsequently ink was dried for 1 hour by ordinary temperature normal relative humidity (20 degree C and 60%RH).

[0174] Next, it exposed all over the Ath page of wavelength:the layer by which ink jet record was carried out using the laser aligner of the outside cylinder drum method of 830nm, a 32ch multi-beam, and resolution 4000dpi, and thermal coagulation of the ink jet Records Department of Layer A was carried out. Under the present circumstances, a focus is shifted and the beam diameter in a layer A front face was made for the direction of vertical scanning to be set to 20 micrometers. Exposure changed energy by the 50 mj/cm² unit to 200 - 450 mj/cm², performed it, searched for optimum conditions for every charge of a printing plate, and used for printing evaluation what was exposed by optimum conditions.

(Presswork) It printed like samples 1-10 (example 1).

(Printing evaluation)

- the gradation evaluation profit **** printed matter (printing appearance deer the 500th sheet) of a gradation image was observed visually, and the smoothness of the gradation of the gradation image section was evaluated. The obtained result is shown in Table 3.

[0175]

[Table 3]

試料 No.	親水性層 B		層 A または層 C		画像形成方法	グラデーション画像の 階調評価
	塗布液 No.	層形成方法	塗布液 No.	層形成方法		
11	B-1	No.16 のワイヤーバーで 塗布した後、70℃で5分間 乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間 乾燥した	インクジェット 方式7	試料2に対して グラデーション画像の 再現がより滑らかな 印刷物が得られた
12	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間 乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間 乾燥した	インクジェット 方式5	試料7に対して グラデーション画像の 再現がより滑らかな 印刷物が得られた
13	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間 乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間 乾燥した	インクジェット 方式7	試料8に対して グラデーション画像の 再現がより滑らかな 印刷物が得られた
14	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間 乾燥した	A-1	No.5 のワイヤーバーで 塗布した後、55℃で3分間 乾燥した	インクジェット 方式8	試料9に対して グラデーション画像の 再現がより滑らかな 印刷物が得られた
15	B-2	No.16 のワイヤーバーで 塗布した後、70℃で5分間 乾燥した	C-2	No.5 のワイヤーバーで 塗布した後、55℃で3分間 乾燥した	インクジェット 方式6	試料10に対して グラデーション画像の 再現がより滑らかな 印刷物が得られた

[0176] The gradation image of gradation smoother than the printed matter by the printing version of the samples 2, 7-10 in which the printed matter by the printing version of the samples 11-15 which formed the image by the ink jet method using two sorts of ink formed the image by the ink jet method which used one sort of ink was obtained so that clearly from Table 3.

[0177]

[Effect of the Invention] this invention -- depending -- if -- specification -- printing -- a plate -- a charge -- using -- technical -- a high level -- a field -- reaching -- and -- equipment -- cheap -- being available -- aquosity - oiliness -- ink -- using -- an ink jet -- a recording method -- an image -- recording -- things -- being special -- a development -- nothing -- printing -- a version -- it can manufacture -- manufacture -- an approach -- it can provide .

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the mimetic diagram showing an example of the decentralized structure of the necklace-like colloidal silica used for this invention.

[Drawing 2] It is the mimetic diagram showing the decentralized structure of the silica particle of conventional colloidal silica.

[Description of Notations]

- 1 Conventional Colloidal Silica
- 2 Spherical Silica Particle
- 3 Necklace-like Colloidal Silica
- 4 Spherical Silica Particle

[Translation done.]

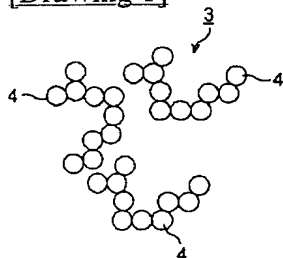
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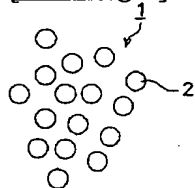
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]